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(54) Method and system for interactive messaging

(57) A method and system for interactive message communication, including the steps of receiving a marked up e-mail by an interactive voice response system, the marked up e-mail containing a menu, converting the menu from text to speech, producing a speech menu, reading the speech menu from the interactive voice response system to a telephone unit, and transmitting a response to the marked up e-mail based on the speech menu.
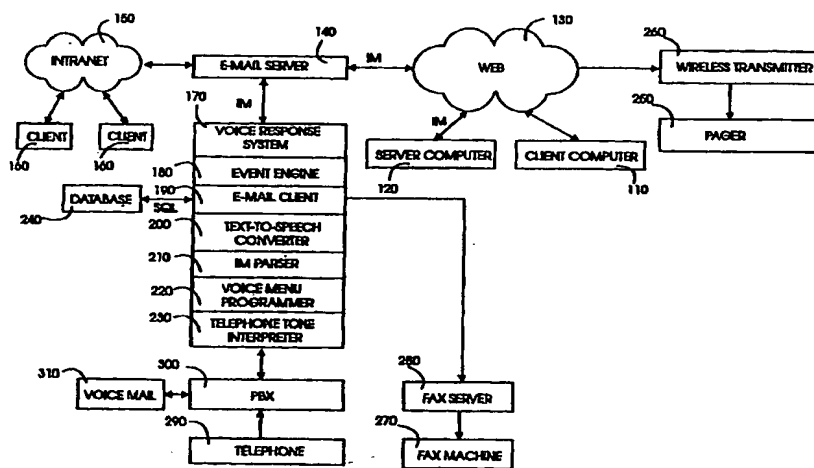
FIGURE 1

Description

FIELD OF THE INVENTION

5   **[0001]**   The present invention relates to tele-communication.

BACKGROUND OF THE INVENTION

[0002]   Computerized telephony provides integrated e-mail, voice and fax support. Such systems can manage
10   incoming and outgoing e-mail messages, phone calls and faxes in all-digital form. Such systems can provide function-
ality such as interactive voice response, call tracking transaction histories, unique call ID's, and much more. For a
detailed description of a computerized telephony product, refer to http://www.brite.com.
[0003]   One drawback of computerized telephony systems is that a mobile subscriber dialing in to his voice
response system is limited in what functions he can perform in response to input he receives. The mobile subscriber
15   can only carry out a fixed set of actions that have been pre-programmed into the voice response system, and as such
his ability to reply to incoming messages is restricted. For example, he may only be able to reply to conventional voice
mail by dictation into the voice response system.

SUMMARY OF THE INVENTION
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[0004]   The present invention provides a method for a mobile subscriber to access his e-mail by dialing in to an inter-
active voice response system, and to reply to his e-mail by pressing one or more keys on his telephone. It also provides
a means whereby a subscriber is notified in advance whenever e-mail arrives at the interactive voice response system.
In a preferred embodiment, the present invention uses a special type of e-mail, referred to below as an interactive mes-
25   sage (IM) since it provides the capability for its recipient to reply by pressing keys on a telephone pad.
[0005]   The present invention also provides a method and system for creating interactive messages and for trans-
mitting them to an interactive voice response system.
[0006]   The interactive message of the present invention preferably includes three parts: a message, a menu and
header fields with parameters. In one embodiment of the present invention the message is a text message. In an alter-
30   nate embodiment of the present invention the message is an audio file. The menu contains an indexed list of replies
that a subscriber can select from by indicating the index number of a desired reply. The voice response system reads
the replies to the listening subscriber who has dialed in, and in turn the subscriber selects one of the replies by pressing
on one or more keys on the telephone. The selected reply is then formatted as an e-mail message, and sent back to
the original sender.
35   **[0007]**   The present invention offers mobile subscribers the opportunity to receive e-mail and respond, without being
connected to the Internet, and without having to call up the sender. Using the present invention, a remote subscriber
can dial up his voice response system using a cellular or conventional telephone, after being notified of an arriving e-
mail, he can listen to the e-mail and he can send back a reply e-mail. He can also instruct the voice response system
to perform specific actions in response to the e-mail, such as faxing back a reply, requesting information or making a
40   transaction.
[0008]   Whereas prior art voice response systems only provide a fixed set of pre-programmed reply actions, the
present invention enables a creator of an IM to customize his own set of reply action alternatives on an individual mes-
sage-by-message basis. The receiver of such an IM need only press on one or more keys of his telephone to select one
of the reply action alternatives and initiate the action. In broad terms, prior art voice response systems only provide a
45   pre-programmed fixed set of possible reply actions, this set thus being system-specific. The voice response system of
the present invention provides for a message-specific set of possible reply actions, this set being customizeable for
each individual message.
[0009]   The present invention also enables generation of dynamic menus within an IM. For example, an interactive
voice response system can generate a menu based on a subscriber's userid. The userid can be used to indicate a cat-
50   egory to which the subscriber belongs (such as "platinum cardholder," "gold cardholder" or "standard cardholder"), and
the menu presented to the subscriber upon dial-up to the voice response system can be generated dynamically for that
category. This provides for different sets of possible reply actions for different categories of subscribers. Generation of
interactive messages with dynamic menus can be carried out by the interactive voice response system itself.
[0010]   There is thus provided in accordance with a preferred embodiment of the present invention a method for
55   interactive message communication, including the steps of receiving a marked up e-mail by an interactive voice
response system, the marked up e-mail containing a menu, converting the menu from text to speech, producing a
speech menu, reading the speech menu from the interactive voice response system to a telephone unit, and transmit-
ting a response to the marked up e-mail based on the speech menu.

[0011] There is also provided in accordance with a preferred embodiment of the present invention a method for interactive message communication, including the steps of monitoring an e-mail server for the presence of marked up e-mail, downloading marked up e-mail from the e-mail server to an e-mail client within an interactive voice response system after the monitoring step indicates its presence at the e-mail server, sending by the interactive voice response system a notification to a subscriber of the presence of marked up e-mail at the interactive voice response system, calling by the subscriber from a telephone unit to the interactive voice response system to retrieve at least one marked up e-mail, and replying to the retrieved at least one marked up e-mail by the telephone unit.

[0012] There is also provided in accordance with a preferred embodiment of the present invention a method for interactive message communication, including the steps of creating a marked up e-mail including header fields and parameters, and a menu, and transmitting the marked up e-mail to an interactive voice response system.

[0013] There is also provided in accordance with a preferred embodiment of the present invention a method for interactive message communication, including the steps of creating a marked up e-mail including a menu, transmitting the marked up e-mail to an interactive voice response system, converting the menu from text to speech, producing a speech menu, reading the speech menu from the interactive voice response system to a telephone unit, and transmitting a response to the marked up e-mail based on the speech menu.

[0014] There is also provided in accordance with a preferred embodiment of the present invention a method for interactive voice response including the steps of detecting the arrival of marked up e-mail, receiving the marked up e-mail, parsing the marked up e-mail, deriving voice menus based on the marked up e-mail, transmitting the voice menus, and interpreting telephone tones in response to the voice menus.

[0015] There is also provided in accordance with a preferred embodiment of the present invention an interactive message communication system, including an interactive voice response system receiving a marked up e-mail, the marked up e-mail containing a menu, and reading a speech menu to a telephone unit, a text-to-speech converter converting the menu from text to speech, producing a speech menu, and a telephone unit receiving the speech menu, and transmitting to the interactive voice response system a response to the marked up e-mail based on the speech menu.

[0016] There is also provided in accordance with a preferred embodiment of the present invention an interactive message communication system including an event engine monitoring an e-mail server for the presence of marked up e-mail, an interactive voice response system containing an e-mail client and downloading marked up e-mail from the e-mail server to the e-mail client after the event engine indicates its presence at the e-mail server, and sending a notification to a subscriber of the presence of marked up e-mail, and a telephone unit calling the interactive voice response system to retrieve at least one marked up e-mail, and replying to the retrieved at least one marked up e-mail.

[0017] There is also provided in accordance with a preferred embodiment of the present invention an interactive message communication system, including a mail creation tool creating a marked up e-mail including header fields and parameters, and a menu, and a transmitter transmitting the marked up e-mail to an interactive voice response system.

[0018] There is also provided in accordance with a preferred embodiment of the present invention an interactive message communication system, including a mail creation tool creating a marked up e-mail including a menu, an interactive voice response system receiving a marked up e-mail, and transmitting a speech menu to a telephone unit, a text-to-speech converter converting the menu from text to speech, producing a speech menu, and a telephone unit receiving the speech menu, and transmitting to the interactive voice response system a response to the marked up e-mail based on the speech menu.

[0019] There is also provided in accordance with a preferred embodiment of the present invention an interactive voice response system including an event engine for detecting arriving marked e-mail, an e-mail client for receiving marked up e-mail, a mail interpreter for parsing marked up e-mail, a programming engine for programming voice menus based on the marked up e-mail, and an tone interpreter for interpreting telephone tones in response to the voice menus.

[0020] There is also provided in accordance with a preferred embodiment of the present invention an interactive message including a marked up language version including a menu, and header fields and parameters.

[0021] That is also provided in accordance with a preferred embodiment of the present invention a method for handling an interactive message containing a marked up language version and a natural language version, including dispatching the marked up language version as a MIME attachment and dispatching the natural language version as an SMTP-compliant e-mail.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] The present invention will be more fully understood and appreciated from the following detailed description, taken in conjunction with the drawings in which:

Figure 1 is a simplified schematic diagram of a preferred embodiment of the present invention whereby an IM is created and sent, a mobile subscriber is notified of its arrival and replies by means of a telephone unit; and

Figures 2A - 2D illustrate the operation of an interactive voice response system in accordance with a preferred

embodiment of the present invention.

LIST OF APPENDICES

5   [0023]   Appendix A is a listing of interactive voice response menus in XML syntax, in accordance with a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

10   [0024]   Internet browsers brought with them the advent of visual Internet as we know it today. Prior to web browsing Internet communication was predominantly carried out through a command line interface, whereby displays were text-only and information was obtained by downloading files via transfer protocols such as ftp. At the core of web browsing lies the HyperText Markup Language (HTML) page.
      [0025]   HTML is a language for describing page layouts. HTML works with basic objects referred to as universal
15   resource locators (URLs) that contain IP addresses for objects along with optional commands to execute. HTML provides a designer with the ability to position text and graphics in a page, specify fonts, colors, background patterns, play audio files, link to other HTML pages and much more. Each screen that appears when a client browses the web is rendered from an HTML page, and most Internet browsers enable one to view the HTML source page corresponding to a display, Web designers typically work with object files, such as images, audio and video, and create compelling HTML
20   pages for laying them out. A reference for HTML is the specification "HyperText Markup Language" located at http://www.204.57.196.12/reference/htmlspec2.0/htmlspec281194_l.html:
      [0026]   Recently there has been progress in enabling appliances without video displays to also access information from the Internet. Wireless devices such as pagers can now use a new markup language, Handheld Device Markup Language (HDML) to communicate with Internet servers. Tele-communication devices can now use a-new markup lan-
25   guage, Voice Markup Language (VoxML™), developed by Motorola, to request information from the Internet References for HDML are (1) the article "Proposal for a Handheld Device Markup Language" located at http://www.uplanet.com/pub/hdml_w3c/hdml_proposal.html, and (2) the "Handheld Device Markup Language Specification" located at http://www.uplanet.com/pub/hdml_w3c/hdml20-1.html.
      References for VoxML are (1) the article "About VoxML" located at http://voxml.com/about.html, and (2) the article
30   "Motorola's VoxML Markup Language" available at this same location. VoxML is compliant with the eXtensible Markup Language (XML). A reference for XML is St. Laurent, Simon, XML: A Primer, MIS Press, Foster City CA, 1998.
      [0027]   The analogy between visual and audio Internet browsing is that Internet browsers correspond to interactive voice response systems, and HTML correspond to VoxML. What HTML is to Internet browsers, VoxML is to voice response systems. VoxML is used to program a hierarchy of voice "menus," each menu being executable by a VoxML
35   interpreter within a voice response system. Each such menu can instruct the voice response system to read audio files, accept inputs from a telephone unit, carry out specific actions such as sending a fax, and more. A VoxML menu can instruct the voice response system to invoke another VoxML menu -- the same way in which HTML pages link to one another, VoxML menus link to one another.
      [0028]   Internet browsing opened up a wealth of information to remote users running client computers around the
40   world. In the same fashion VoxML opens up this wealth of information to mobile users communicating with telephones around the world. Centralized information can be accessed by people on the road, thus keeping them up-to-date and enhancing the ever-growing global connectivity.
      [0029]   Applicant's co-pending U.S. Patent Application entitled A METHOD AND SYSTEM FOR WIRELESS DATA COMMUNICATION, the disclosure of which is hereby incorporated by reference, discloses a method and system for
45   enabling wireless data terminals to access information from the Internet.
      [0030]   The present invention provides a method and system whereby a mobile subscriber can access his e-mail by dialing in to an interactive voice response system, and can reply to his e-mail by pressing on one or more keys of his telephone. In a preferred embodiment the present invention uses a special type of e-mail referred to herein as an interactive message (IM).
50   [0031]   Whereas prior art voice response systems only provide a fixed set of pre-programmed reply actions, the present invention enables a creator of an IM to customize his own set of reply action alternatives on an individual message basis. The receiver of such an IM need only press on one or more keys of his telephone to select one of the reply action alternatives and initiate the action. In broad terms, prior art voice response systems only provide a pre-programmed fixed set of possible reply actions, this set thus being system-dependent. The voice response system of the
55   present invention provides for a message-specific set of possible reply actions, this set being customized for each individual message.
      [0032]   In accordance with a preferred embodiment of the present invention, an IM preferably contains a mark up language version including a message and an indexed menu. In one embodiment of the present invention the message

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is a text message. In an alternate embodiment of the present invention the message is an audio file. It also contains header fields and parameters. The header fields preferably include the sender's identification, a date and time, and a subject for the message. In one embodiment of the present invention the IM also contains a natural language version corresponding to the mark up language version.

[0033]   The present invention includes an IM creation tool for producing e-mail messages in the IM format. In one embodiment of the present invention, an interactive voice response system is used to download a subscriber's IM, and derive voice menus from it. In another embodiment of the present invention, the IMs are produced by the interactive voice response system itself A subscriber dialing into the voice response system can access an IM addressed to him, and can listen to the message therein. In addition, the voice response system reads the indexed menu, and the subscriber can then select one of the replies by pressing on one or more of his telephone keys. The selected reply is formatted as an e-mail reply, and sent back to the original sender.

[0034]   The present invention also includes means for notifying a subscriber whenever an IM addressed to him has arrived at the voice response system. It also provides a means for the voice response system to monitor arrival of an IM intended for the subscriber at a remote e-mail server, and to download the IM after it arrives.

[0035]   The voice response system of the present invention preferably includes: (1) an interface with a PBX telephone exchange, used for a telephony interface, (2) an e-mail client, (3) an IM engine for parsing IM messages, (4) an engine for programming voice menus, (5) an engine for interpreting tones and (6) an event engine for monitoring arriving e-mail messages. In an embodiment of the present invention where the IM contains an audio file as its message, the voice response system also includes: (7) a digital audio player.

[0036]   Reference is now made to Figure 1, which is a simplified schematic diagram of a preferred embodiment of the present invention whereby an IM is created and sent, a mobile subscriber is notified of its arrival and replies by means of a telephone unit. A user first creates an IM, which is an e-mail containing header fields and parameters, a message and a menu. Regarding the header fields, in one embodiment of the present invention a subject header field contains a unique text, such as [IM], to indicate that the e-mail is an IM. Regarding the message, in one embodiment of the present invention the message is a text message. On an alternate embodiment of the present invention the message is an audio file. The audio file can be included in the IM as an attachment or alternatively as a URL to an audio file located elsewhere.

[0037]   The IM contains a markup language version in a markup language syntax such as HTML, HDML and VoxML. The markup language version includes the message and the menu. In one embodiment of the present invention the IM may optionally also contain a natural language version of the content of the ML message. In an alternate embodiment the IM does not contain a natural language version, but such a version can be generated by filtering the IM on the fly.

[0038]   The markup language version of the IM is formatted by the creation application as a Multi-Purpose Internet Mail Extension (MIME) attachment. The natural language version, if also present in the IM, is formatted as a standard Simple Mail Transfer Protocol (SMTP) compliant e-mail. MIME extends the format of Internet mail to allow non-US-ASCII textual messages, non-textual messages, multi-part message bodies, and non-US-ASCII information in message headers.

[0039]   For example, the header fields, message and menu of an IM might be respectively as follows:

HEADER FIELDS:

[0040]

From: Bill
To: Andy
Date: Monday, November 2, 1998, 9:30:00 AM
Subject: [IM] Meeting tomorrow

MESSAGE

[0041]

I have scheduled a meeting tomorrow from 2:00 PM — 4:00 PM on the topic of interactive messaging, and would be grateful if you could attend.

MENU

[0042]

5   1. I plan to attend the meeting.
        2. I cannot attend the meeting, but would like to send a substitute representative.
        3. I need more information about the meeting agenda.
        4. Sorry, but I am not interested in attending the meeting.

10 NATURAL LANGUAGE VERSION

[0043]

        An ML message has been sent by Bill at 9:30 AM on Monday, November 2, 1998 with a body: "I have scheduled a
15   meeting tomorrow from 2:00 PM — 4:00 PM on the topic of interactive messaging, and would be grateful if you
        could attend." and the following replies —"1. I plan to attend the meeting. 2. I cannot attend the meeting, but would
        like to send a substitute representative. 3. I need more information about the meeting agenda. 4. Sorry, but I am
        not interested in attending the meeting."

20 [0044]   In one embodiment of the present invention, the application creating the IM runs on a client computer 110.
        In an alternate embodiment it runs on a server computer 120 through use of an HTML interface. In this latter case, the
        user creates his IM by filling in information and content on an HTML form over the Web 130. In an embodiment of the
        present invention where the IM contains an audio file, the application creating the IM enables a user to dictate a mes-
        sage, or alternatively to include a link to an existing audio file.
25 [0045]   After creating his IM, the user mails it to its designated recipient. The IM is then sent over Web 130 to an e-
        mail server 140, corresponding to the address on the e-mail, via an SMTP protocol. In one embodiment of the present
        invention, e-mail server 140 is connected to a corporate intranet 150 servicing many corporate clients 160.
        [0046]   The present specification describes an interactive voice response system 170 containing an event engine
        180, an e-mail client 190, a text-to-speech converter 200, an IM parser 210, a voice menu programmer 220 and a tele-
30   phone tone interpreter 230. A subscriber to the system of the present invention registers his username, and event
        engine 180 is programmed to monitor e-mail server 140 for any arriving IM intended for the subscriber. Event engine
        180 checks e-mail server 140 regularly, for example, every 10 minutes, for the presence of an IM sent to the subscriber.
        [0047]   When event engine 180 detects that an IM intended for the subscriber has arrived at e-mail server 140, e-
        mail client 190 downloads the mark up language version of the IM to voice response system 170. In a preferred embod-
35   iment of the present invention, e-mail client 190 is connected to a database 240. Database 240 is used to cache sub-
        scriber IMs and to enable a subscriber to filter his IMs. In a preferred embodiment of the present invention, database
        240 is a standard query language (SQL) database, and enables a subscriber to query and filter his inbox of available
        IMs. For example, a subscriber could request the database to prepare only those available IMs originating from Bill, or
        only those IMs having the text string "sports" in their subject header field.
40 [0048]   When the IM has been downloaded to voice response system 170, voice response system 170 sends a noti-
        fication to the subscriber. In one embodiment of the present invention, the notification is sent to a wireless device such
        as a pager 250 by means of a wireless transmitter 260. The wireless device may alternatively be a cellular telephone.
        It is readily apparent to those skilled in the art that alternate embodiments are possible, such as voice response system
        170 sending the notification to fax machine 270 via a fax sewer 280, or by a call to a conventional telephone.
45 [0049]   In one embodiment of the present invention, e-mail sewer 140 sends a natural language version of the IM to
        the subscriber via an SMTP protocol. As described hereinabove, the natural language version can either be pan of the
        IM, or alternatively it can be derived from the IM. After being sent, however, the IM remains on e-mail server 140 at least
        until such time as it is removed from e-mail server 140 by voice response system 170.
        [0050]   When voice response system 170 has received the markup language version of the IM, its contents are
50   parsed by IM parser 210, and then used by voice menu programmer 220 to program voice menus in voice response
        system 170. Voice menu programmer uses text-to-speech converter 200 to convert the text portions of the IM to voice
        responses. In an embodiment of the present invention where the IM contains an audio file, voice menu programmer
        incorporates the audio file into the voice responses.
        [0051]   The subscriber, upon receiving notification of an incoming IM, culls voice response system 170 from a tele-
55   phone unit 290. Telephone unit 290 may be a conventional or a cellular telephone. In one embodiment of the present
        invention, telephone unit 290 connects to voice response system 170 by means of a PBX telephone exchange 300, also
        used to access the subscriber's voice mail 310.
        [0052]   Upon the subscriber's dialing in to voice response system 170, voice response system reads a message

based on the incoming IM. Referring to the abovementioned example, the subscriber will hear: "You have a message from Bill (the sender identified in the "From" header field of the IM) at 9:30 AM on Monday, November 2, 1998 (the date and time identified in the "Date" header field of the IM). I have scheduled a meeting tomorrow from 2:00 PM — 4:00 PM on the topic of interactive messaging, and would be grateful if you could attend." This is followed by "Press 1 for 'I plan to attend the meeting.' Press 2 for 'I cannot attend the meeting, but would like to send a substitute representative.' Press 3 for 'I need more information about the meeting agenda.' Press 4 for 'Sorry, but I am not interested in attending the meeting.'"

[0053]   Upon the subscriber's pressing on the 1, 2, 3 or 4 numerical telephone key, telephone tone interpreter 230 translates the tone, and voice response system 170 generates a corresponding standard SMTP reply e-mail message. The reply e-mail message is then sent as a reply to Bill (the sender identified in the "From" header field of the IM). If the subscriber presses the 3 key of telephone unit 290, then voice response system 170 sends an e-mail to Bill with the following text: "You sent 'I have scheduled a meeting tomorrow from 2:00 PM — 4:00 PM on the topic of interactive messaging, and would be grateful if you could attend.' Andy replied 'I need more information about the meeting agenda.'"

[0054]   In another embodiment of the present invention the menu contains a list of actions to be performed by voice response system 170. Examples of actions include: (1) contacting the sender by phone, (2) contacting the sender by fax, (3) requesting information, (4) making a transaction, and (5) authorizing (or denying authorization for) a transaction. The creator of an IM can specify action-based alternatives for the menu, and the subscriber, upon receiving such an IM, can select one of the action alternatives to be carried out as a reply by pressing on one or more keys of telephone unit 290.

[0055]   It can thus be appreciated that whereas prior art voice response systems can only carry out a fixed set of pre-programmed reply actions, the present invention enables the creator of an IM to provide his own set of actions. In other words, whereas the possible set of reply actions that can be carried out by subscribers to prior art voice response systems is system-specific, to present invention makes it possible for the possible set of reply actions to be individual message-specific.

[0056]   In another embodiment of the present invention, the menu of an IM is generated dynamically. For example, the menu can be based on the userid. An example application where this feature is useful is a financial institution having a variety of customer categories. The menu presented upon dial-up can depend on the customer category. Customers with larger accounts can be offered a different menu selection than those with smaller accounts.

[0057]   In another embodiment of the present invention, the IM need not contain a message. For example, when dynamic menu generation is used as in the abovementioned example, the initial IM presented to a customer upon dialing in can contain a menu without a message. The voice response system can begin at once with a menu selection, without reading a message. In these latter two embodiments the IM can be generated by the interactive voice response system itself

[0058]   Reference is now made to Appendix A, which is a listing of interactive voice response menus in XML syntax, in accordance with a preferred embodiment of the present invention. The first file SYSTEM.XML contains the system instructions when the subscriber calls in to the voice response system. The first portion of this file contains an audio message, referenced by AMSG, which reads the welcome audio file welcome, VOX. The subscriber is then prompted for a four digit userid and the menu from file USER.ELML is executed. After completing USER.ELML the system plays another audio message, goodbye, VOX and terminates.

[0059]   USER.ELML begins by searching a user database using a standard query language (SQL) query to identify the current subscriber's userid that was keyed in. If no such userid is found, an audio message is played from audio file invalid. VOX indicating to the caller that his userid is invalid. Otherwise, if the userid is found in the database, the system determines the subscriber's name and reads "Hello *(subscriber-name)*, press 1 for mail press 2 for pim."

[0060]   If the subscriber presses 1 for mail, then the menu from file NEWMAIL.ELML is executed. Upon completing NEWMAIL.ELML the menu USER.ELML is also completed.

[0061]   NEWMAIL.ELML begins by searching for the subscriber's new mail using an SQL query. If no new mail is found, a "No new mail" message is read. Otherwise, if n new mail items are found, the system reads "You have n new messages. Press 1 to listen to mail." If the subscriber presses 1 then the menu from file MAIL.ELML is executed. Upon completing MAIL.ELML the menu NEWMAIL.ELML is also completed.

[0062]   MAIL.ELML begins by searching for the subject fields in the subscriber's new mail. If no new mail is found, a "No new mail" message is read. Otherwise, the system loops through the new mail and reads the subjects. MENU.ELML is completed when the loop finishes reading the subjects from all new mail.

[0063]   Reference is now made to Figures 2A — 2D, which illustrate the operation of an interactive voice response system in accordance with a preferred embodiment of the present invention. Figures 2A, 2B, 2C and 2D correspond to files SYSTEM.ELML, USER.ELML, NEWMAIL.ELML and MAIL.ELML, respectively, from Appendix A.

[0064]   Figure 2A is a simplified illustration of to master system menu for an interactive voice response system in accordance with a preferred embodiment of the present invention. When a subscriber dials in to the system, a system menu is started at step 410. At step 420 the voice response system reads a welcome message to to subscriber, and

prompts him to enter his userid. At step 430 the subscriber enters his userid by pressing on keys of his telephone. At step 440 the system invokes a user menu. The user menu is illustrated in Figure 2B. After completing the user menu, the system reads a goodbye menu at step 450 and exits at step 460.

[0065] Figure 2B is a simplified illustration of a user menu for an interactive voice response system in accordance with a preferred embodiment of the present invention. The user menu is started at step 470. At step 480 the system searches for the userid in a user database, by means on an SQL query. At step 490 the system checks whether or not the userid input has been found in the user database. If not, at step 500 the system reads an "invalid userid" message and then exits the user menu at step 530. Otherwise, if the userid is present in the user database the system can identify the subscriber by name. At step 510 the system reads a hello message to the subscriber, referencing the subscriber by his name, and prompts him to press the "1" key to check his mail, and the "2" key for his personal information manager (PIM). At step 520 the system checks what the subscriber has pressed, If he pressed 1 the system invokes a new-mail menu. If he pressed 2 the system invokes a pim menu. The newmail menu is illustrated in Figure 2C. The pim menu is not illustrated. After executing the newmail or pim menu the system exits the user menu at step 630.

[0066] Figure 2C is a simplified illustration of a newmail menu for an interactive voice response system in accordance with a preferred embodiment of the present invention. The newmail menu is started at step 540. At step 550 the voice response system searches, by means of an SQL query, an e-mail database for new e-mail items sent to the subscriber, and records the count of how many such e-mail items were found. At step 560 the system checks whether or not new e-mail was found. If not, at step 570 the system reads a "no new mail" message to the subscriber and then exits the newmail menu at step 630. Otherwise, if new mail is found, then at step 580 the system loops through each new mail item, and reads a message to the subscriber indicating how many e-mail items he has in the system, and prompting him to press 1 to listen to his mail. At step 600 the subscriber presses the "1" key of his telephone, and at step 610 the system invokes the mail menu. The mail menu is illustrated in Figure 2D. Upon completing the mail menu the system continues looping through the new mail at step 620. When the loop finishes, and all new mail has been processed, the system exits the newmail menu at step 630.

[0067] Figure 2D is a simplified illustration of a mail menu for an interactive voice response system in accordance with a preferred embodiment of the present invention. The mail menu is started at step 640. At step 650 the voice response system searches, by means of an AQL query, the e-mail database for the subject field of new e-mail items. At step 660 the system checks whether or not new e-mail was found. If not, at step 670 the system reads a "no new mail" message to the subscriber, and then exits the mail menu at step 710. Otherwise, if new mail is found, then at step 680 the system loops through each new mail item, and reads a message to the subscriber with the subject of each mail item. The system continues looping through the new mail at step 700. When the loop finishes the system exits the mail menu at step 710.

[0068] It is clear from the above discussion that many variations on the above described system architecture are possible without deviating from the spirit of the present invention. For example, one variation is that the replies in the menu can be encoded with acronyms rather than numerals.

[0069] Another variation is to have the interactive voice response system verity the subscriber's tone press in order to prevent erroneous replies. Such verification can be carried out by requesting the subscriber to confirm his response.

[0070] Another variation is for the voice response system to provide the subscriber with the opportunity to repeat the message or the menu, before the subscriber responds.

[0071] Another variation is for the voice response system to enable the user to indicate that he prefers not to select any of the possible replies, a "none of the above" option.

[0072] Another variation is for the subscriber to select a reply by speaking into the telephone unit, rather than pressing on one or more keys. In this embodiment telephone tone interpreter 230 is replaced by a voice interpreter.

[0073] Another variation is for there to be no notification of an arriving IM. Instead, a subscriber dials up the voice response system from time-to-time to check whether or not there is an IM waiting for him.

[0074] Another variation is for the menu of the IM to include a set of audio files, rather than a set of text replies of action replies. In this case there is no need for text-to-speech conversion within to voice response system. This variation can arise in (1) a situation where the IM is initially created with a menu of audio files, or (2) in a situation where the IM is initially created with a menu of text replies that are pre-converted to speech prior to the IM arriving at the voice response system.

[0075] Thus it will be appreciated by persons skilled in the art that the present invention is not limited by what has been particularly shown and described hereinabove. Rather the present invention includes combinations and sub-combinations of the various features described hereinabove as well as modifications and extensions thereof which would occur to a person skilled in the art and which do not fall within the prior art.

APPENDIX A

```
SYSTEM.ELML
<ELML>
   <AMSG
   FILENAME="C:/Progra-1/ElectricLighthouse/VOX/welcome.VOX"/>
      <!--welcome, please enter access code-->

   <INPUT TYPE="ACTION_DIGIT" NUMBER="4">
      <NEXTMENU
         MENU="C:/Progra-1/ElectricLighthouse/Elml/USER.ELML"/>
   </INPUT>
      <!--e.g. function(filename,IVR_RESPONSE);-->
   <AMSG
   FILENAME="C:/Progra-1/ElectricLighthouse/VOX/goodbye.VOX"/>
</ELML>


USER.ELML
<ELML>
   <SQL QUERY="SELECT * FROM USERS WHERE ID=%ACTION_DIGIT%">
      <NOROWS>
         <AMSG
   FILENAME="C:/Progra-1/ElectricLighthouse/VOX/invalid.VOX"/>
      </NOROWS>
      <LOOPROWS>
         <MSG>Hello %%Name%%, press 1 for mail press 2 for
            pim</MSG>
         <INPUT TYPE=DIGIT NUMBER=1>
            <OPTION VALUE=1
   NEXTMENU="C:/Progra-1/ElectricLighthouse/Elml/NEWMAIL.ELML
   ?ACTION_DIGIT=%ACTION_DIGIT%">
            </OPTION>
            <OPTION VALUE=2
   NEXTMENU="C:/Progra-1/ElectricLighthouse/Elml/PIM.ELML">
            </OPTION>
         </INPUT>
      </LOOPROWS>
   </SQL>
</ELML>


NEWMAIL.ELML
<ELML>
   <SQL QUERY="SELECT COUNT(NEW) AS COUNTOFNEW FROM MAIL
   WHERE NEW=1 AND ID=%ACTION_DIGIT%">
      <NOROWS>
         <MSG>No new mail</MSG>
      </NOROWS>
      <LOOPROWS>
         <MSG>You have %%COUNTOFNEW%% new messages. Press 1 to
            listen to mail</MSG>
         <INPUT TYPE=DIGIT NUMBER=1>
            <OPTION VALUE=1
   NEXTMENU="C:/Progra-1/ElectricLighthouse/Elml/MAIL.ELML?
   ACTION_DIGIT=%ACTION_DIGIT%"
            </OPTION>
         </INPUT>
      </LOOPROWS>
   </SQL>
</ELML>
```

```
MAIL.ELML
<ELML>
    <SQL QUERY="SELECT Subject FROM Mail WHERE
ID=%ACTION_DIGIT% AND new=1">
        <NOROWS>
            <MSG>No new mail</MSG>
        </NOROWS>
        <LOOPROWS>
            <MSG>%%Subject%%</MSG>
        </LOOPROWS>
    </SQL>
</ELML>
    <!-- SQL QUERY="SELECT Subject FROM Mail WHERE
    ID=%ACTION_DIGIT% AND new=1; UPDATE Mail SET new=0 WHERE
    ID=%ACTION_DIGIT% AND new=1;" -->
```

Claims

1. A method for interactive message communication, comprising the steps of:

   receiving a message by an interactive voice response system, the message containing menu information;
   producing as least a speech menu based on said menu information;
   reading the speech menu from the interactive voice response system to a telephone unit; and
   transmitting a response to the message using the telephone unit based on the speech menu.

2. The method of claim 1 wherein the message uses VoxML syntax.

3. The method of claim 1 wherein the message contains a text message, and said producing step includes converting to text message from speech to text, producing a speech message, and said reading step includes reading the speech message.

4. The method of claim 1 wherein the message contains an audio message, and said reading step includes reading the audio message.

5. The method of claim 1 wherein the message comprises a natural language message.

6. The method of claim 1 wherein the telephone unit is a cellular telephone.

7. The method of claim 1 wherein said transmitting step is effected by a subscriber speaking into the telephone unit.

8. The method of claim 1 wherein the menu is a list of actions.

9. A method for interactive message communication, comprising the steps of;

   creating a marked up e-mail including header fields and parameters, and a menu; and
   transmitting the marked up e-mail to an interactive voice response system.

10. A method for interactive message communication, comprising the steps of:

    creating a marked up e-mail including a menu;
    transmitting the marked up e-mail to an interactive voice response system;
    converting the menu to speech, producing a speech menu;
    reading the speech menu from the interactive voice response system to a telephone unit; and
    transmitting a response to the message using the telephone unit based on the speech menu.

11. The method of claim 10 wherein said creating step is performed by means of an HTML interface to a server computer.

12. The method of claim 10 wherein the marked up e-mail contains a text message, and said converting step includes converting the text message from text to speech, producing a speech message, and said reading step includes reading the speech message.

13. The method of claim 10 wherein the marked up e-mail contains an audio file message, and said reading step includes reading the audio file message.

14. The method of claim 10 wherein the marked up e-mail comprises a natural language e-mail.

15. A method for interactive voice response comprising the steps of

> detecting the arrival of e-mail;
> receiving the e-mail;
> parsing the e-mail;
> deriving voice menus based on the e-mail;
> transmitting the voice menus; and
> interpreting telephone sounds in response to the voice menus.

16. The method of claim 15 wherein said e-mail includes a menu.

17. The method of claim 15 wherein the method employs a cellular telephone.

18. An interactive message communication system, comprising;

> an interactive voice response system receiving a message, the message containing menu information, and reading a speech menu based on menu information to a telephone unit
> a test-to-speech converter converting the menu information from test to speech, producing a speech menu; and
> a telephone unit receiving the speech menu, and transmitting to the interactive voice response system a response to the message based on the speech menu.

19. The interactive message communication system of claim 18 wherein the message uses VoxML syntax.

20. The interactive message communication system of claim 18 wherein the message contains a text message, and said text-to-speech converter also converts the text message from text to speech, producing a speech message, and said interactive voice response system also reads the speech message to the telephone unit.

21. The interactive message communication system of claim 18 wherein the message contains an audio message, and said interactive voice response system also reads the audio message to the telephone unit.

22. The interactive message communication system of claim 18 wherein the message is contained within a natural language message, and wherein said interactive voice response system includes a message handler sending the natural language message as a regular SMTP e-mail to a designated e-mail address.

23. The interactive message communication system of claim 18 wherein the telephone unit is a cellular telephone.

24. The interactive message communication system of claim 18 wherein the response transmitted by said telephone unit is generated by a subscriber speaking into said telephone unit.

25. The interactive message communication system of claim 18 wherein the menu is a list of actions.

26. An interactive message communication system, comprising:

> a mail creation tool creating a marked up e-mail including header fields and parameters, and a menu; and
> a transmitter transmitting the marked up e-mail to an interactive voice response system,

wherein said mail creation tool uses an HTML interface and runs on a server computer.

27. An interactive message communication system, comprising

a mail creation tool creating a marked up e-mail including a menu;
an interactive voice response system receiving a marked up e-mail, and reading a speech menu to a telephone unit;
a text-to-speech converter converting the menu from text to speech, producing a speech menu; and
a telephone unit receiving the speech menu, and transmitting to the interactive voice response system a response to the message based on the speech menu.

28. The interactive message communication system of claim 27 wherein said mail creation tool uses an HTML interface and runs on a server computer.

29. The interactive message communication system of claim 27 wherein the marked up e-mail contains a text message, and said text-to-speech converter also converts the text message from text to speech, producing a speech message, and said interactive voice response system also reads the speech message to the telephone unit.

30. The interactive message communication system of claim 27 wherein the marked up e-mail contains an audio file message, and said interactive voice response system also reads the audio file message to the telephone unit.

31. The interactive message communication system of claim 27 wherein the marked up e-mail is contained within a natural language e-mail.

32. An interactive voice response system comprising:

an event engine for detecting arriving e-mail;
an e-mail client for receiving the e-mail;
a mail interpreter for parsing the e-mail;
a programming engine for programming voice menus based on the e-mail; and
a sound interpreter for interpreting telephone sounds in response to the voice menus.

33. The interactive voice response system of claim 32 wherein said e-mail includes a menu.

34. The interactive voice response system of claim 32 wherein the interactive voice response system employs a cellular telephone.
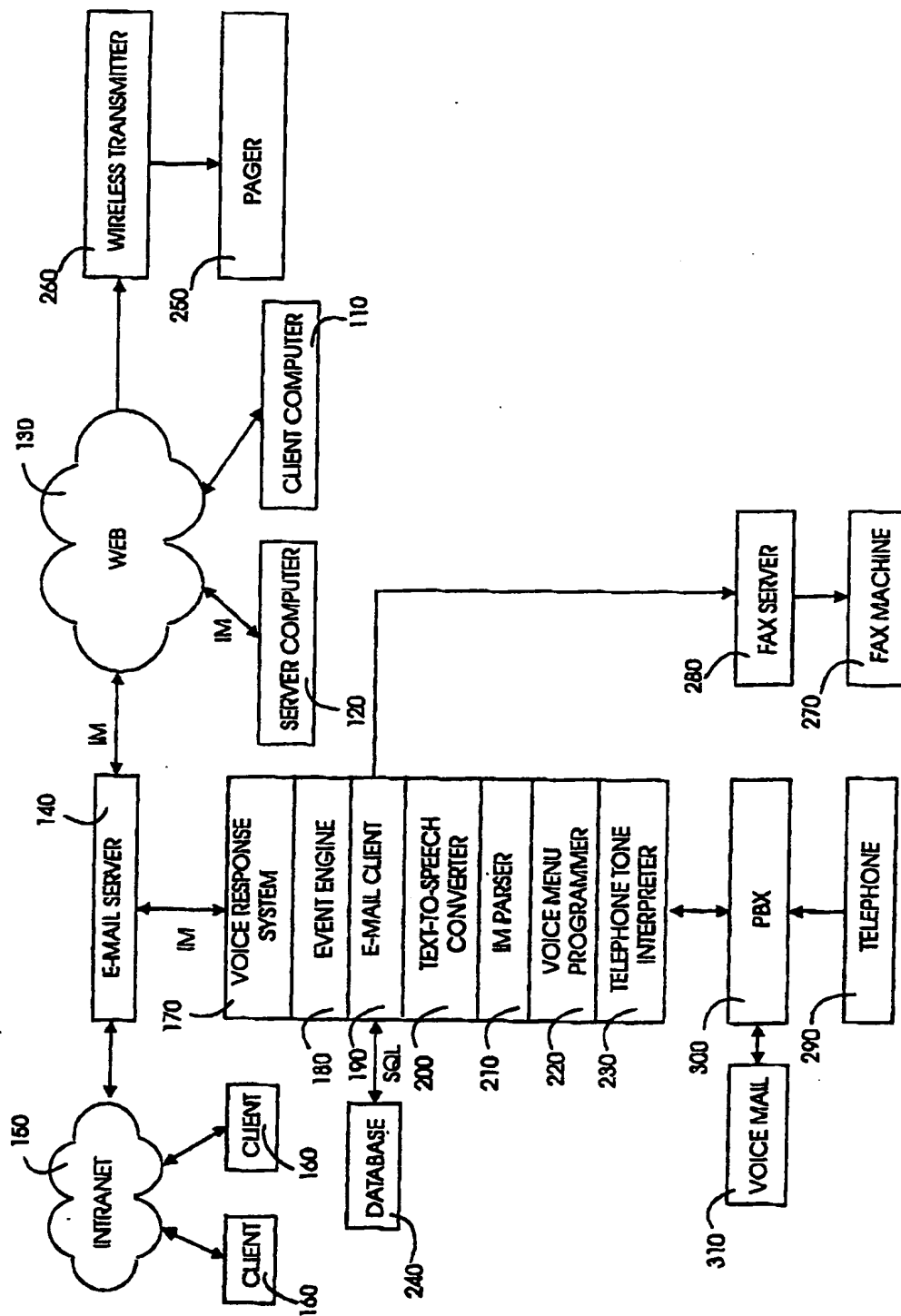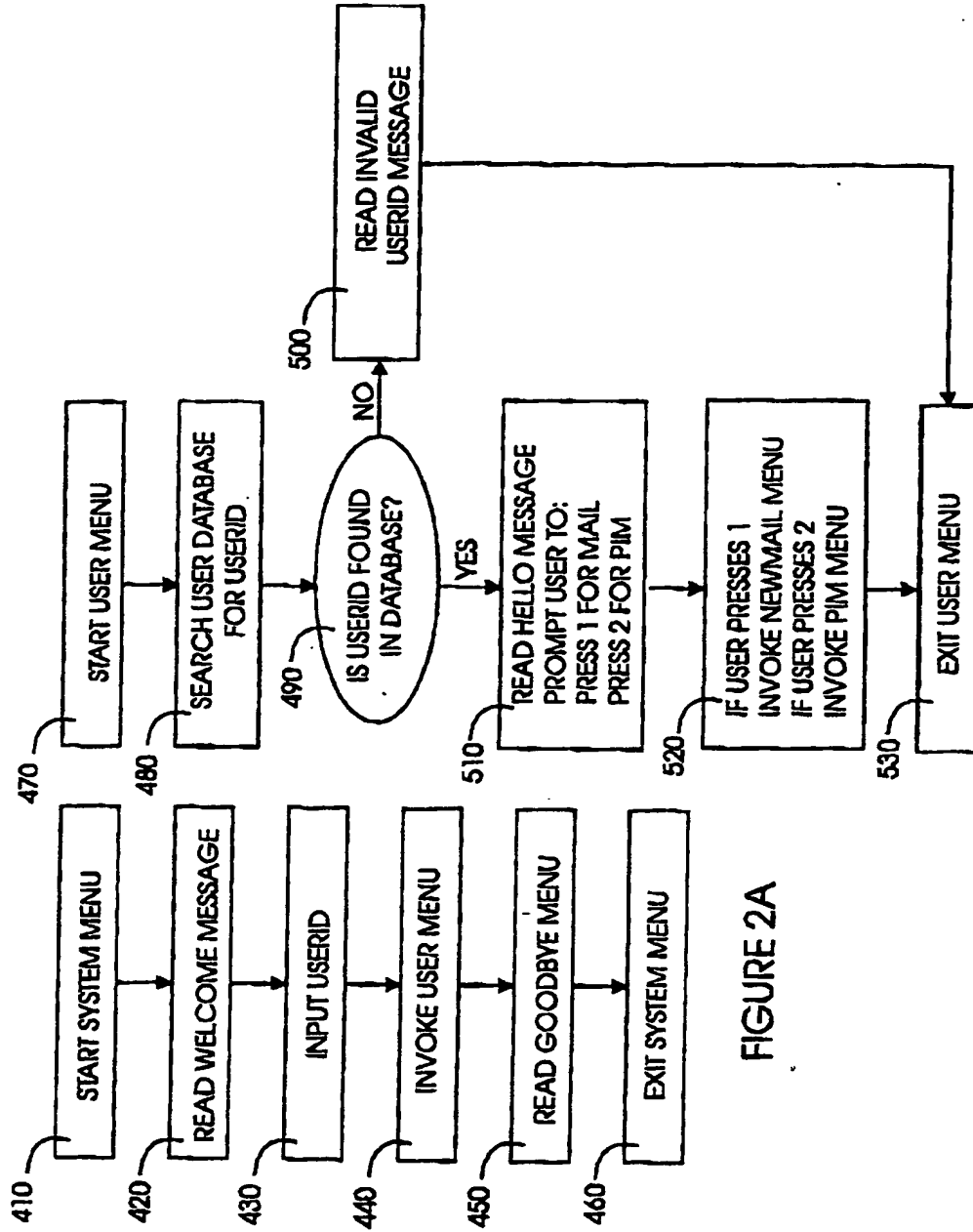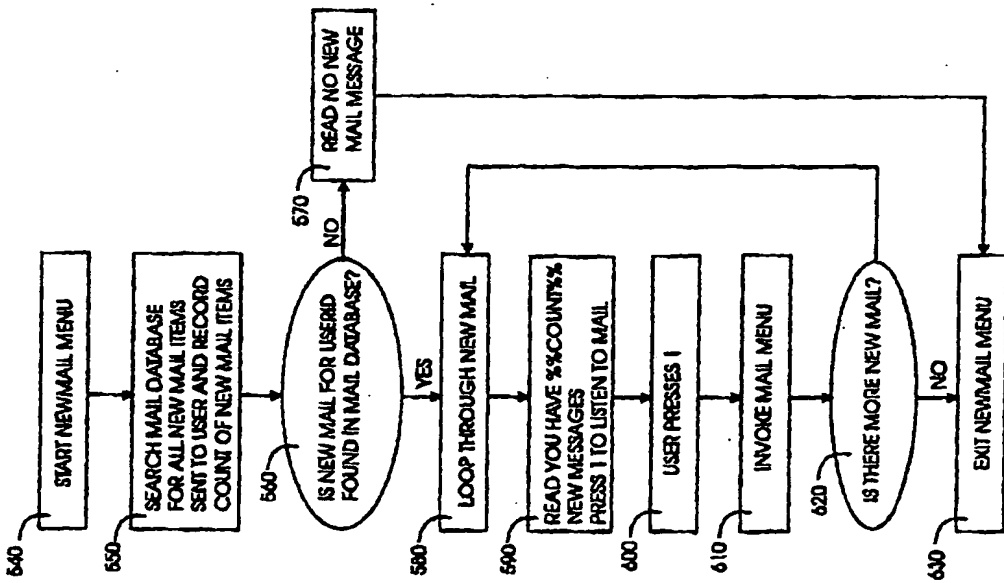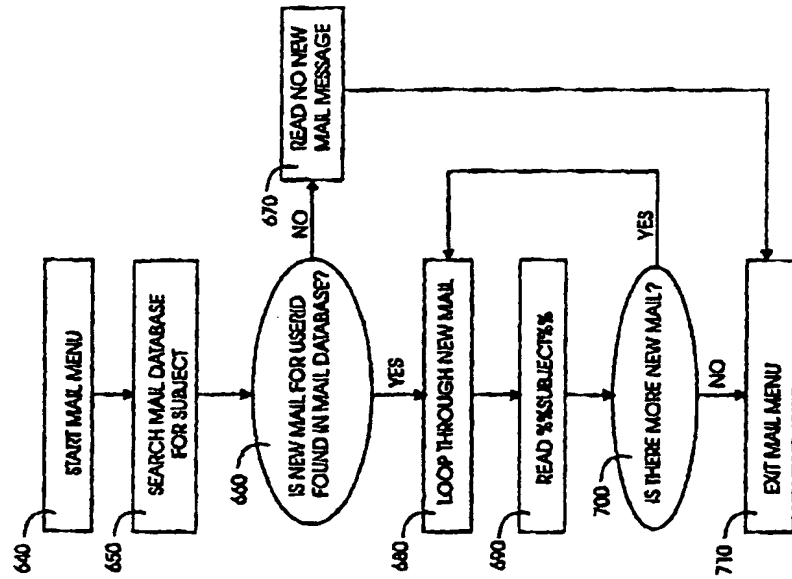
FIGURE 1

FIGURE 2B

FIGURE 2A

START USER MENU — 470

SEARCH USER DATABASE FOR USERID — 480

IS USERID FOUND IN DATABASE? — 490

READ INVALID USERID MESSAGE — 500

NO

YES

READ HELLO MESSAGE PROMPT USER TO: PRESS 1 FOR MAIL PRESS 2 FOR PIM — 510

IF USER PRESSES 1 INVOKE NEWMAIL MENU IF USER PRESSES 2 INVOKE PIM MENU — 520

EXIT USER MENU — 530

START SYSTEM MENU — 410

READ WELCOME MESSAGE — 420

INPUT USERID — 430

INVOKE USER MENU — 440

READ GOODBYE MENU — 450

EXIT SYSTEM MENU — 460

FIGURE 2D

FIGURE 2C